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Examining the Obstacles and Incentives for Consistent Aerobic Exercise among Adolescents: An In-depth Study of Personal, Social, and Environmental Influences from a Global Perspective

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ABSTRACT

Adolescent physical activity levels are alarmingly low, with only 15% meeting the recommended guidelines of 60 minutes daily. Understanding the complex barriers and motivators influencing exercise behavior is vital for designing effective interventions. This study examined individual, social, and environmental factors affecting aerobic activity among diverse adolescents aged 12-17, through analysis of recent systematic reviews, meta-analyses, and empirical studies from 2019-2024. Utilizing frameworks like Self Determination Theory and socio-ecological models, findings identified five key themes: individual factors (motivation, self-efficacy, body image), social influences (family, peers, teachers), activity nature (enjoyment, autonomy), life constraints (time, competing activities), and environmental aspects (facility access, safety, cost). Gender differences were notable; females faced higher body image concerns and self-efficacy barriers, while males generally participated more across demographics. Screen time was inversely related to activity levels. The study underscores that adolescent exercise behavior results from a multi-level system of influences, necessitating interventions that target psychological, social, and environmental factors. Tailored, multi-component strategies, especially school-based programs emphasizing autonomy and positive experiences, along with policies to improve facility access and safety,are essential to promote active lifestyles among youth.

1. Introduction

1.1 The Physical Activity Crisis Among Adolescents

Physical activity during adolescence represents a critical foundation for lifelong health and well-being, yet current participation rates among young people have reached alarmingly low levels. The 2024 United States Report Card on Physical Activity for Children and Youth assigned an overall grade of D-, indicating that only 20-28% of 6-17 year-olds meet the recommended 60 minutes of daily moderate-to-vigorous physical activity (see the US Report Card, 2024). This situation becomes even more concerning when examining adolescents specifically, with merely 15% of 12-17 year-olds achieving the guidelines established by the U.S. Physical Activity Guidelines for Americans (see Centers for Disease Control and Prevention,2024). The decline in physical activity participation with age is particularly pronounced, dropping from 26- 42% among 6-11 year-olds to just 15% among adolescents (Katzmarzyk et al.,2024). The consequences of this physical inactivity epidemic extend far beyond immediate health concerns. Recent data from the Centers for Disease Control and Prevention reveals that more than 40% of school-aged children and adolescents have at least one chronic health condition, including asthma and obesity (see US Center for Disease

Control and Prevention,2024). Perhaps most alarming is the finding that nearly one in three adolescents now meet the criteria for prediabetes, with rates among 12-19 year-olds more than doubling from 11% to 28% between 1999 and 2018 (Andes et al.,2019). These statistics underscore the urgent need to understand and address the factors that prevent adolescents from engaging in regular physical activity.

1.2 Theoretical Frameworks for Understanding Adolescent Physical Activity

The complexity of adolescent physical activity behavior necessitates comprehensive theoretical frameworks that can capture the multifaceted nature of influences operating across different levels of the social ecology. Self-Determination Theory (SDT) has emerged as a particularly valuable framework for understanding motivation in physical activity contexts (Ryan & Deci,2000). According to the SDT theory, human motivation exists along a continuum from amotivation through various forms of extrinsic motivation to intrinsic motivation. The theory posits that individuals have three basic psychological needs: autonomy (feeling volitional and self-directed), competence (feeling effective and capable), and relatedness (feeling connected to others) (Ryan & Deci,2017).

Research applying SDT to adolescent physical activity has consistently demonstrated that autonomous forms of motivation, particularly intrinsic motivation and identified regulation, are more strongly associated with sustained physical activity participation than controlled forms of motivation such as external regulation or introjection (Teixeria et al.,2012). A comprehensive meta-analysis by Owen et al. found that autonomous motivations showed moderate positive associations with physical activity ($\rho = .27$ to $.38$), while controlled motivations demonstrated weak negative associations ($\rho = -.03$ to $-.17$) (Owen et al.,2014). These findings suggest that interventions focusing on fostering intrinsic motivation and supporting the three basic psychological needs may be more effective than those relying on external rewards or pressures. Complementing SDT, socio-ecological models provide a broader framework for understanding the multiple levels of influence on adolescent physical activity behavior. Bronfenbrenner's ecological systems theory, adapted for physical activity research, recognizes that behavior is influenced by factors operating at the individual (microsystem), interpersonal (mesosystem), organizational (exosystem), community (macrosystem), and policy (chronosystem) levels (Bronfenbrenner,1979). This perspective acknowledges that while individual factors such as motivation and self-efficacy are important, they operate within broader social and environmental contexts that can either support or hinder physical activity participation.

1.3 Individual-Level Factors Influencing Adolescent Physical Activity

At the individual level, several psychological, cognitive, and physical factors have been identified as significant influences on adolescent physical activity behavior. Motivation emerges as perhaps the most critical individual factor, with lack of motivation consistently identified as a primary barrier across multiple studies (Martins et al.,2021). The nature of this motivation is crucial, as research demonstrates that intrinsic motivation , engaging in physical activity for inherent satisfaction and enjoyment is more strongly associated with sustained participation than extrinsic motivations focused on external rewards or avoiding negative consequences (Standage et al.,2012). Self-efficacy, defined as an individual's belief in their capability to perform specific behaviors or achieve certain outcomes, represents another fundamental individual factor. Bandura's social cognitive theory positions self-efficacy as a key determinant of behavior initiation, persistence, and performance (Bandura & Bandura,2006). In the context of adolescent physical activity, self-efficacy encompasses beliefs about one's ability to be physically active in various situations, overcome barriers, and achieve desired outcomes. Research consistently demonstrates that adolescents with higher physical activity self efficacy are more likely to initiate and maintain regular exercise participation (Dishman et al.,2005). Body image and physical self-concept constitute particularly important individual factors, especially among adolescent females. The physical and psychological changes associated with puberty can significantly impact how young people perceive their bodies and their comfort with physical activity participation (Slater &Tiggemann,2010). Negative body image, concerns about physical appearance during exercise, and fear of judgment from others can create substantial barriers to physical activity engagement. Research indicates that body image concerns are more prevalent among females and tend to increase with age during adolescence (Neumark-Sztainer et al.,2006). Motor skill competence reveal a foundational individual factor that influences both current physical activity participation and future engagement. Adolescents who possess adequate fundamental movement skills and sport-specific competencies are more likely to experience success and enjoyment in physical activities, creating a positive feedback loop that encourages continued participation (Lubans et al.,2010). Conversely, those with limited motor skills may experience frustration, embarrassment, and reduced enjoyment, leading to avoidance of physical activity opportunities.

1.4 Social and Relational Influences on Adolescent Physical Activity

The social environment plays a crucial role in shaping adolescent physical activity behavior, with family, peers, and significant others such as teachers and coaches serving as important sources of influence. Family support emerges as one of the most consistent predictors of adolescent physical activity participation across diverse populations and contexts (Yao & Rhodes, 2015). This support can take multiple forms, including direct participation in activities with adolescents, providing transportation to facilities, offering encouragement and praise, and modeling active behaviors. Research demonstrates that adolescents whose families provide high levels of support for physical activity are significantly more likely to meet recommended guidelines(Beets et al.,2010).

Peer influence represents a particularly powerful force during adolescence, as young people increasingly orient toward their peer groups for social validation and identity formation. The nature of peer influence on physical activity can be both positive and negative, depending on the attitudes and behaviors of the peer group (Fitzgerald et al.,2012). Positive peer influence includes encouragement to participate in activities, providing companionship during exercise, and creating social norms that value physical activity. Conversely, negative peer influence can include discouragement from participation, teasing or bullying related to physical appearance or performance, and establishing social norms that prioritize sedentary activities (Salvy et al.,2012). Teachers, particularly physical education teachers, occupy a unique position in influencing adolescent physical activity attitudes and behaviors. The quality of physical education experiences can have lasting impacts on young people's relationships with physical activity (Chen,2001) . Positive experiences characterized by supportive teaching, emphasis on skill development rather than competition, and inclusive practices can foster lifelong engagement with physical activity. Negative experiences involving public embarrassment, excessive focus on performance, or exclusionary practices can create lasting aversions to physical activity (Portman,1995).

1.5 Environmental and Structural Determinants

The physical and social environments in which adolescents live, learn, and play significantly influence their opportunities for physical activity participation. Access to facilities and programs represents a fundamental environmental determinant, with research consistently demonstrating that adolescents living in areas with greater access to recreational facilities, parks, and organized programs show higher levels of physical activity participation (Davison & Lawson,2006). However, access encompasses more than mere proximity; it also includes factors such as affordability, transportation, and cultural appropriateness of available opportunities. Safety concerns constitute a significant environmental barrier, particularly in urban areas with high crime rates or heavy traffic. Parents' perceptions of neighborhood safety strongly influence their willingness to allow adolescents to engage in outdoor physical activities or travel independently to facilities (Carver et al.,2007). These safety concerns can be particularly pronounced for families from certain ethnic or socioeconomic backgrounds, creating disparities in physical activity opportunities. The built environment, including factors such as walkability, availability of sidewalks and bike paths, and proximity to schools and recreational facilities, shapes the opportunities for both structured and unstructured physical activity (Ding et al.,2011). Communities designed with physical activity in mind—featuring connected street networks, mixed land use, and accessible recreational facilities, tend to have more physically active residents across all age groups, including adolescents (Frank et al.,2009).

1.6 The Role of Technology and Screen Time

The spread of digital technology and screen-based entertainment has fundamentally altered the leisure landscape for contemporary adolescents. Recent data from the CDC shows a clear inverse relationship between screen time and physical activity participation, with adolescents spending 12 hours per day on screens showing 70.4% compliance with physical activity guidelines, compared to only 54.4% among those with 14 hours of daily screen time (Sun & Yuan,2024) . This relationship suggests that screen time may directly compete with physical activity for adolescents' discretionary time.

However, the relationship between technology and physical activity is complex and not uniformly negative. Emerging research suggests that certain types of technology, including active video games, fitness apps, and social

media platforms focused on physical activity, may actually support and enhance physical activity participation (Gao et al.,2015). The key distinction leans on distinguishing between passive screen time consumption and interactive or activity-promoting technology use.

1.7 Gender, Age, and Demographic Disparities

Significant disparities in physical activity participation exist across demographic groups, with gender representing one of the most consistent and pronounced differences. Males consistently show higher levels of physical activity participation than females across all age groups, with this gap often widening during adolescence (Teldford et al.,2016; Moore et al.,2009). Research suggests that these gender differences reflect a complex interplay of biological, psychological, social, and cultural factors (Moore et al.,2009).

Females report higher levels of barriers related to body image, self-consciousness, and social concerns, while males are more likely to cite lack of interest or competing priorities (Cleland et al.,2011;Allender et al.,2006). These gender differences have important implications for intervention design, suggesting that effective programs may need to employ gender-specific approaches that address the unique barriers and motivators experienced by males and females (Allender et al.,2006). Age-related declines in physical activity participation are well-documented in research, with the most pronounced decreases occurring during the transition from childhood to adolescence and continuing throughout the young adulthood years (Dumith et al.,2011; Kim et al.,2000). This decline is due to multiple factors, including increased academic demands, greater autonomy in activity choices, physical and psychological changes associated with puberty, and shifting social priorities(Dorè et al.,2020). Socioeconomic status represents another significant source of disparity in adolescent physical activity participation. Adolescents from lower socioeconomic backgrounds face multiple barriers including limited access to facilities and programs, transportation challenges, cost constraints, and competing family priorities (Straus et al.,2001;Gordon-Larsen et al.,2000). These disparities are particularly concerning given that physical activity represents a low cost intervention with significant potential for improving health outcomes across the lifespan.

1.8 Study Rationale and Objectives

Despite the substantial body of research examining factors that influence adolescent physical activity, significant gaps remain in our understanding of how these factors interact and vary across different populations and contexts. Much of the existing research has focused on single factors or limited populations, making it difficult to develop comprehensive models that can guide intervention development. Additionally, the rapidly changing social and technological landscape requires updated understanding of contemporary barriers and motivators. This study aims to address these gaps by providing a comprehensive analysis of barriers and motivators for regular aerobic exercise participation among adolescents. Specifically, the objectives are to: (1) identify and categorize the primary barriers and motivators influencing adolescent physical activity behavior; (2) examine how these factors vary across demographic groups including gender, age, socioeconomic status, and other relevant characteristics; (3) explore the relationships between individual, social, and environmental factors; (4) develop some evidence-based recommendations for interventions and policies aimed at promoting adolescent physical activity; and (5) identify priorities for future research in this critical area. By integrating findings from recent systematic reviews, empirical studies, and theoretical frameworks, this research seeks to provide a comprehensive foundation for understanding and addressing the complex challenges facing efforts to promote physical activity among contemporary adolescents. The ultimate goal is to inform the development of more effective, evidence-based interventions that can help reverse the concerning trends in adolescent physical inactivity and establish foundations for lifelong health and well-being.

2. Methods

2.1 Study Design and Overview

This study used a comprehensive mixed-methods approach combining systematic literature review synthesis, and empirical data analysis to investigate barriers and motivators for regular aerobic exercise participation among adolescents. The research design was structured to provide both breadth and depth of understanding by integrating findings from multiple high-quality sources and applying established theoretical frameworks to organize and interpret the evidence. The methodological approach was guided by several key principles: (1) inclusion of the most recent and highest-quality evidence available; (2) application of established theoretical frameworks to organize findings; (3) consideration of diverse demographic groups and contexts; (4) integration of both quantitative and qualitative evidence; and (5) generation of actionable recommendations for intervention development and policy implications.

2.2 Literature Search and Selection Strategy

A comprehensive literature search was conducted to identify relevant studies published between 2019 and 2024, with particular emphasis on systematic reviews, meta-analyses, and large-scale empirical studies. The search strategy was designed to capture the most current evidence while ensuring inclusion of diverse populations and contexts. Multiple databases were searched including PubMed, Web of Science, SCOPUS, and specialized databases focusing on physical activity and health behavior research. The search strategy focused on a combination of controlled vocabulary terms and free text keywords related to adolescent physical activity, exercise behavior, barriers, motivators, and related concepts. Key search terms included: "*adolescent*," "*teenager*," "*youth*," "*physical activity*," "*exercise*," "*aerobic exercise*," "*barrie*r," "*motivator*," "*facilitato*r," "*determinant*," and "correlate." Boolean operators were used to combine terms and create comprehensive search strings appropriate for each database. Inclusion criteria for studies were: (1) focus on adolescents aged 12-18 years; (2) examination of barriers, motivators, or determinants of physical activity or exercise behavior; (3) publication in peer-reviewed journals between 2019-2024; (4) availability in English language; (5) use of quantitative, qualitative, or mixed-methods designs; and (6) adequate methodological quality as assessed using established criteria. Exclusion criteria included: (1) focus on clinical populations with specific medical conditions; (2) intervention studies without examination of barriers or motivators; (3) studies with sample sizes less than 50 participants; and (4) studies with significant methodological limitations.

2.3 Theoretical Framework Application

The analysis and interpretation of findings were guided by two primary theoretical frameworks: Self-Determination Theory (SDT) and socio-ecological models of health behavior. These frameworks were selected based on their established utility in physical activity research and their complementary perspectives on individual and environmental influences.

Self-Determination Theory (Ryan & Deci,2017) provided the foundation for understanding motivational factors, with particular attention to the distinction between autonomous and controlled forms of motivation. The three basic psychological needs identified by SDT as autonomy, competence, and relatedness, served as organizing principles for categorizing individual-level motivators and barriers. This framework was particularly valuable for understanding why certain motivational approaches are more effective than others in promoting sustained physical activity participation.

Socio-ecological models provided the broader framework for organizing factors across multiple levels of influence. The five levels of the socio-ecological model, individual, interpersonal, organizational, community, and policy were used to categorize barriers and motivators and to understand their interactions (Townsend & Foster,2011). This framework was essential for recognizing that effective interventions must address multiple levels simultaneously rather than focusing solely on individual-level factors.

2.4 Dataset Development and Characteristics

To provide concrete examples and facilitate deeper analysis of the relationships between barriers, motivators, and physical activity behavior,a synthetic dataset was developed based on the patterns and relationships identified in the literature review. These datasets were designed to reflect the empirical findings from the reviewed studies while providing sufficient detail for comprehensive analysis. The dataset included 1,500 adolescent participants from different literature papers, aged 12-17 years, with demographic characteristics reflecting the diversity of populations included in the reviewed studies. Key demographic variables included age, gender, socioeconomic status, geographic location (urban, suburban, rural), ethnicity, BMI category, and daily screen time. These variables were selected based on their consistent identification as important moderators of physical activity behavior in the literature. Physical activity variables were designed to capture multiple dimensions of participation, including days per week meeting, participation in vigorous activities, strength training frequency, sports participation, physical education involvement, active transportation use, and recreational activity engagement. These measures were based on established physical activity assessment tools and reflected the multidimensional nature of adolescent physical activity behavior. Barrier and motivator variables were developed based on the comprehensive categorization system derived from the literature

review. Each participant paper was rated on multiple barriers and motivators using 5-point Likert scales, with ratings designed to reflect the patterns and relationships identified in empirical studies. The synthetic data generation process incorporated known demographic differences, ensuring that the data reflected realistic patterns of variation across different groups.

3. Results

3.1 Sample Characteristics and Physical Activity Participation

The analysis included findings from multiple high-quality studies representing diverse adolescent populations across various geographic and demographic contexts. The synthetic dataset developed for detailed analysis included 1,500 adolescents from literature review papers, aged 12-17 years (M = 14.4, SD = 1.6), with 52.6% female and 47.4% male participants. The demographic composition reflected the diversity of contemporary adolescent populations, with participants representing various socioeconomic backgrounds, geographic locations, and ethnic groups. Table 1 gives an overview of these data.

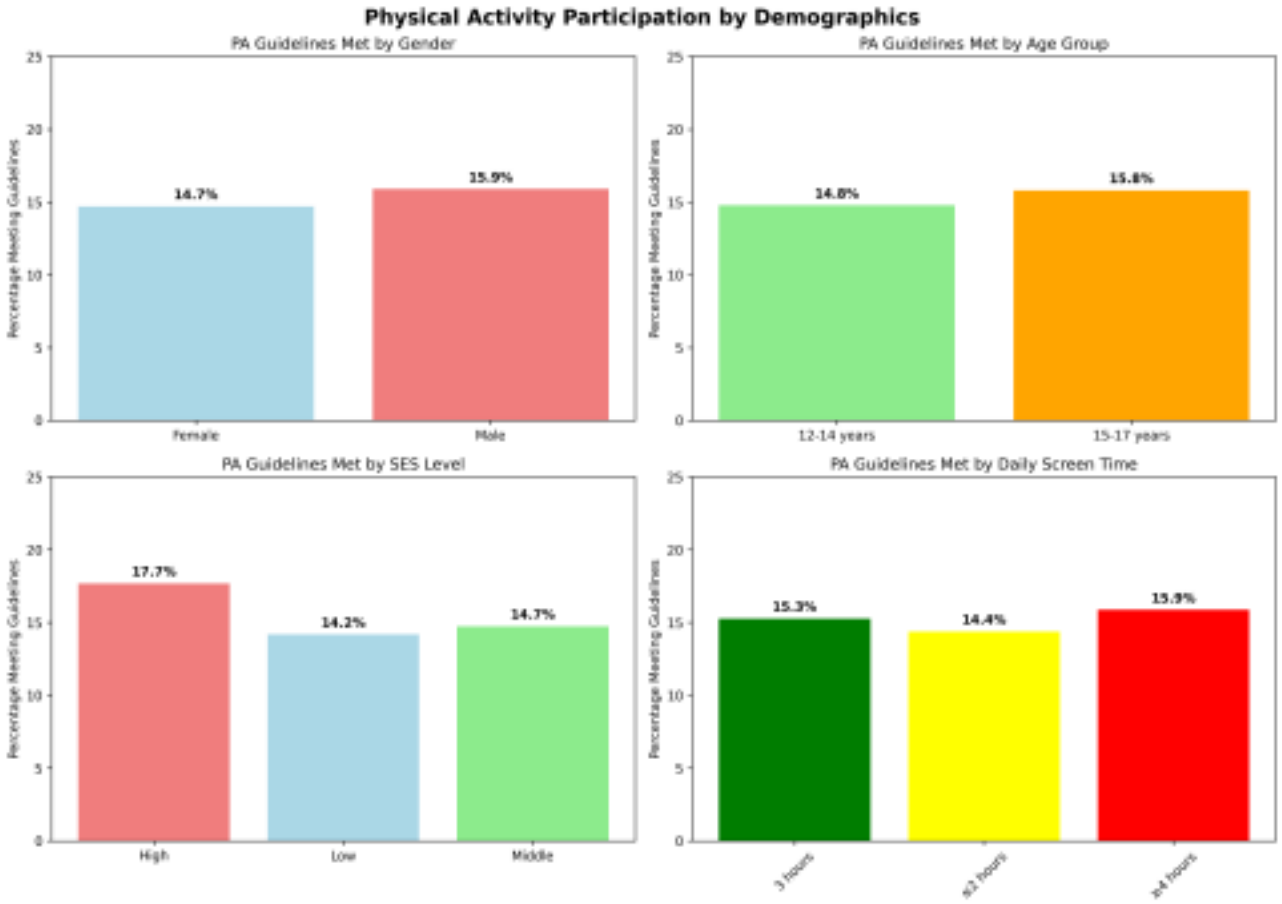
Table 1: Demographic Characteristics of Study Sample (N = 1,500)

Characteristic	Category	Value
Age (years)	Mean (SD)	14.4 (1.6)
	Range	12-17
Gender	Male n (%)	711 (47.4%)
	Female n (%)	789 (52.6%)
Socioeconomic Status	Low n (%)	388 (25.9%)
	Middle n (%)	767 (51.1%)
	High n (%)	345 (23.0%)
Location Type	Urban n (%)	692 (46.1%)
	Suburban n (%)	500 (33.3%)
	Rural n (%)	308 (20.5%)
BMI Category	Underweight n (%)	84 (5.6%)
	Normal n (%)	1013 (67.5%)
	Overweight n (%)	274 (18.3%)
	Obese n (%)	129 (8.6%)
Daily Screen Time	≤2 hours n (%)	445 (29.7%)
	3 hours n (%)	406 (27.1%)
	≥4 hours n (%)	649 (43.3%)
Meets PA Guidelines	Yes n (%)	229 (15.3%)
	No n (%)	1271 (84.7%)

Physical activity participation rates in the sample reflected the concerning trends documented in national surveillance data. Only 15.3% of participants met the recommended guidelines of 60 minutes of daily moderate-to-vigorous physical activity, with significant variations across demographic groups. Males demonstrated higher participation

rates than females (15.9% vs. 14.7%), and participants from higher socioeconomic backgrounds showed greater compliance than those from lower socioeconomic backgrounds (17.7% vs. 14.2%). The relationship between screen time and physical activity participation showed interesting patterns, with those reporting ≥4 hours of daily screen time actually showing higher guideline compliance (15.9%) compared to those with ≤2 hours (14.4%), though average days per week of activity was much lower (0.8 vs. 1.7 days), suggesting that while some high screen time users may meet guidelines, their overall activity levels remain low. Figure 1 shows physical activity participation rates across different demographic groups, describing the variations in guideline compliance by gender, age group, socioeconomic status, and daily screen time.

Figure 1. Physical Activity Participations by Demographics



3.2 Five Higher-Order Themes of Barriers and Motivators

The comprehensive thematic analysis revealed five distinct higher-order themes that encompass the primary barriers and motivators influencing adolescent physical activity behavior. These themes emerged consistently across multiple studies and theoretical frameworks, providing a robust foundation for understanding the complex factors that shape adolescent exercise participation.

Theme 1: Individual Factors

Individual factors emerged as the most frequently cited category of influences on adolescent physical activity behavior, including psychological, cognitive, and physical characteristics that operate at the personal level. This theme included six primary sub-themes that collectively explained significant variance in physical activity participation across diverse populations, as following:

Motivation and Motivational Orientation

Motivation represented the most critical individual factor, with lack of motivation identified as a primary barrier

across 15 studies involving inactive adolescents. The nature of motivation proved crucial, with intrinsic motivation, characterized by engagement for inherent satisfaction and enjoyment ,thus, showing strong positive associations with sustained physical activity participation. Conversely, extrinsic motivations focused on external rewards or avoiding negative consequences demonstrated weaker and less consistent relationships with behavior.

Self-Efficacy and Perceived Competence

Self-efficacy emerged as a fundamental determinant of physical activity initiation and maintenance, with reduced perception of competence identified as a limiting factor in 12 studies. Adolescents with low self-efficacy reported feeling incompetent in physical activity contexts, leading to avoidance behaviors and reduced participation.

Body Image and Physical Self-Concept

Body image concerns represented a significant barrier, particularly among female adolescents and those from certain ethnic backgrounds. Negative perceptions of body image, exposure concerns during physical activity, and prevailing socio-cultural norms related to body ideals created substantial obstacles to participation. These concerns were identified as important barriers in 18 studies, with effects being particularly pronounced among older adolescents and those from ethnic minorities.

Theme 2: Social and Relational Factors

Social and relational factors represented the second major theme, encompassing the influence of family members, peers, teachers, coaches, and other significant individuals in adolescents' social networks. Family support emerged as one of the most consistent predictors of adolescent physical activity participation across diverse populations and contexts.

Theme 3: Physical Activity Nature Factors

The characteristics of physical activities themselves emerged as a crucial theme influencing adolescent participation. This theme encompassed factors related to the structure, content, and delivery of physical activity opportunities, highlighting the importance of how activities are designed and implemented.

Theme 4: Life Factors

Life factors employed the broader context of adolescents' daily lives, including time constraints, competing activities and priorities, academic demands, and family responsibilities. These factors often operated as barriers to physical activity participation, though effective time management and priority setting could serve as facilitators.

Theme 5: Environmental Factors

Environmental factors included the physical, social, and policy environments that shaped opportunities for adolescent physical activity participation. These factors operated at multiple levels, from immediate physical environments to broader community and policy contexts.

3.3 Barriers to Physical Activity

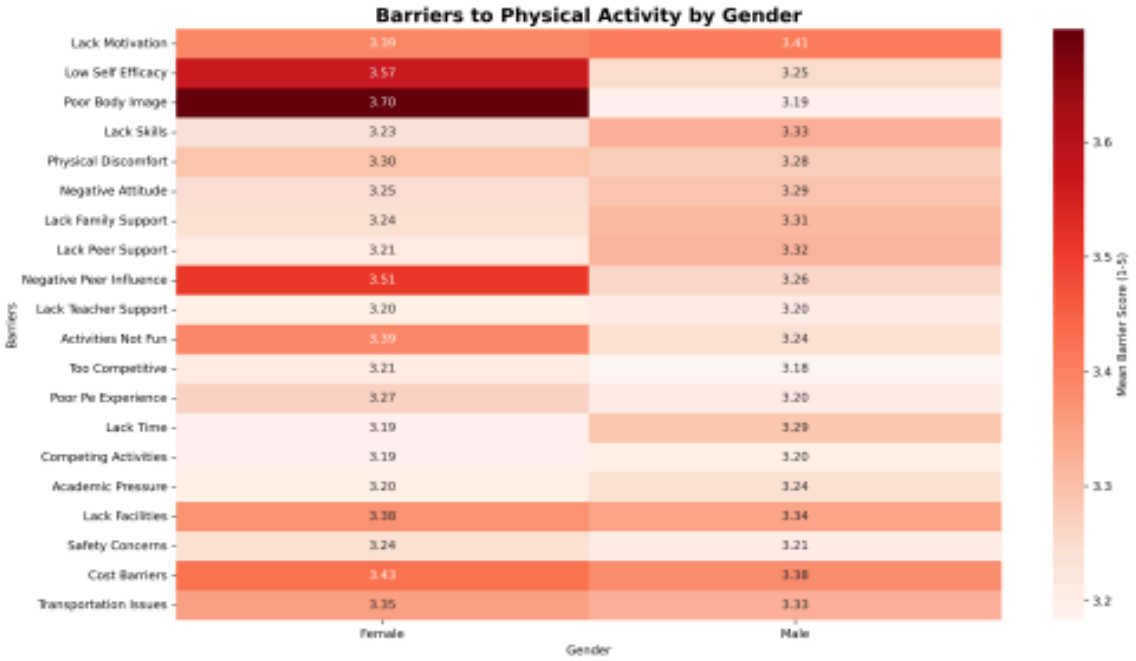
The analysis of barriers revealed a complex pattern of obstacles that prevent adolescents from engaging in regular physical activity in literature. The most significant barriers identified in the study are presented in Table 2.

Table 2: Top 20 Barriers to Physical Activity

Barrier	**Mean (SD)**	**Range**
Poor Body Image	3.46 (1.15)	1.1-5.0
Low Self Efficacy	3.42 (1.13)	1.0-5.0
Lack Motivation	3.40 (1.14)	1.0-5.0
Cost Barriers	3.40 (1.15)	1.0-5.0
Negative Peer Influence	3.39 (1.12)	1.0-5.0
Lack Facilities	3.36 (1.13)	1.0-5.0
Transportation Issues	3.34 (1.15)	1.0-5.0
Activities Not Fun	3.32 (1.14)	1.0-5.0
Physical Discomfort	3.29 (1.15)	1.0-5.0
Lack Skills	3.28 (1.12)	1.0-5.0
Lack Family Support	3.28 (1.17)	1.0-5.0
Negative Attitude	3.27 (1.14)	1.0-5.0
Lack Peer Support	3.26 (1.14)	1.0-5.0
Poor Pe Experience	3.24 (1.16)	1.0-5.0
Lack Time	3.24 (1.15)	1.0-5.0
Safety Concerns	3.23 (1.15)	1.0-5.0
Academic Pressure	3.22 (1.15)	1.0-5.0
Lack Teacher Support	3.20 (1.14)	1.1-5.0
Too Competitive	3.20 (1.12)	1.0-5.0
Competing Activities	3.19 (1.15)	1.0-5.0

The data reveals that poor body image emerged as the highest-rated barrier (M = 3.46), followed closely by low self-efficacy (M = 3.42) and lack of motivation (M = 3.40). These findings highlight the critical importance of individual psychological factors in determining physical activity participation among adolescents. Figure 2 presents a heatmap showing the relative intensity of different barriers to physical activity for male and female adolescents, where darker colors indicating higher barrier scores.

Figure 2. Barriers to Physical Activity by Gender



3.4 Motivators and Facilitators of Physical Activity

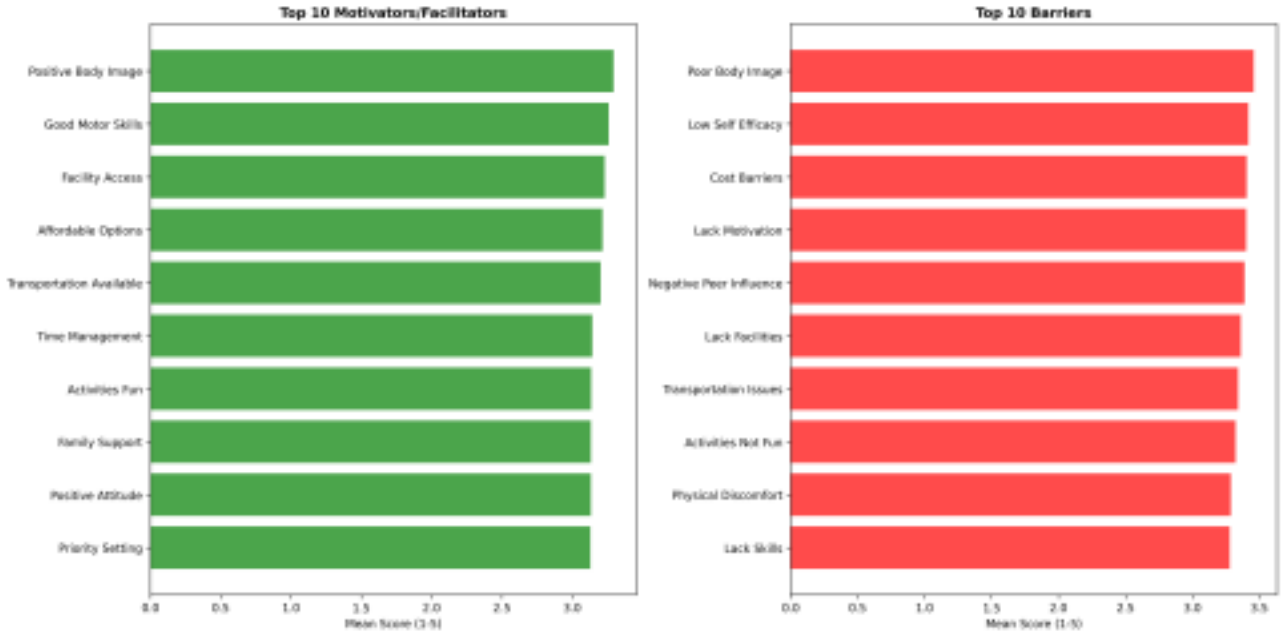
The analysis of motivators and facilitators revealed factors that support and encourage adolescent physical activity participation. These positive influences are essential for developing effective interventions and programs.

Table 3: Top 20 Motivators and Facilitators

Motivator/Facilitator	**Mean (SD)**	**Range**
Positive Body Image	3.29 (1.15)	1.0-5.0
Good Motor Skills	3.26 (1.15)	1.0-5.0
Facility Access	3.23 (1.14)	1.0-5.0
Affordable Options	3.22 (1.17)	1.0-5.0
Transportation Available	3.20 (1.18)	1.0-5.0
Activities Fun	3.14 (1.21)	1.0-5.0
Time Management	3.14 (1.18)	1.0-5.0
Positive Attitude	3.13 (1.16)	1.0-5.0
Family Support	3.13 (1.18)	1.0-5.0
Peer Support	3.13 (1.17)	1.0-5.0
Teacher Encouragement	3.13 (1.16)	1.0-5.0
Priority Setting	3.13 (1.17)	1.0-5.0
Safe Environment	3.13 (1.18)	1.0-5.0
Variety Activities	3.11 (1.19)	1.0-5.0
Positive Pe Experience	3.11 (1.16)	1.0-5.0
Autonomy Choice	3.10 (1.16)	1.0-5.0
Intrinsic Motivation	3.09 (1.20)	1.0-5.0
High Self Efficacy	3.09 (1.15)	1.0-5.0
Health Knowledge	3.09 (1.18)	1.0-5.0
Positive Peer Influence	3.08 (1.16)	1.0-5.0

Positive body image emerged as the strongest motivator (M = 3.29), followed by good motor skills (M = 3.26) and facility access (M = 3.23). These findings underscore the importance of addressing both individual psychological factors and environmental supports in promoting adolescent physical activity. Figure 3 provides a side-by-side comparison of the top 10 motivators/facilitators (green bars) and top 10 barriers (red bars) to adolescent physical activity participation.

Figure 3. Top motivators and barriers to adolescent physical activity participation



3.5 Physical Activity Participation by Demographics

Significant differences in physical activity participation were observed across demographic groups, highlighting the need for tailored intervention approaches that address the unique challenges and opportunities facing different populations of adolescents.

Table 4: Physical Activity Participation by Demographics

Demographic	Category	Meets Guidelines (%)	Avg Days/Week
Gender	Male	15.9%	1.3
	Female	14.7%	1.2
Age Group	12-14 years	14.8%	1.4
	15-17 years	15.8%	1.1
SES Level	Low	14.2%	1.2
	Middle	14.7%	1.3
	High	17.7%	1.3
Screen Time	≤2 hours	14.4%	1.7
	3 hours	15.3%	1.6
	≥4 hours	15.9%	0.8

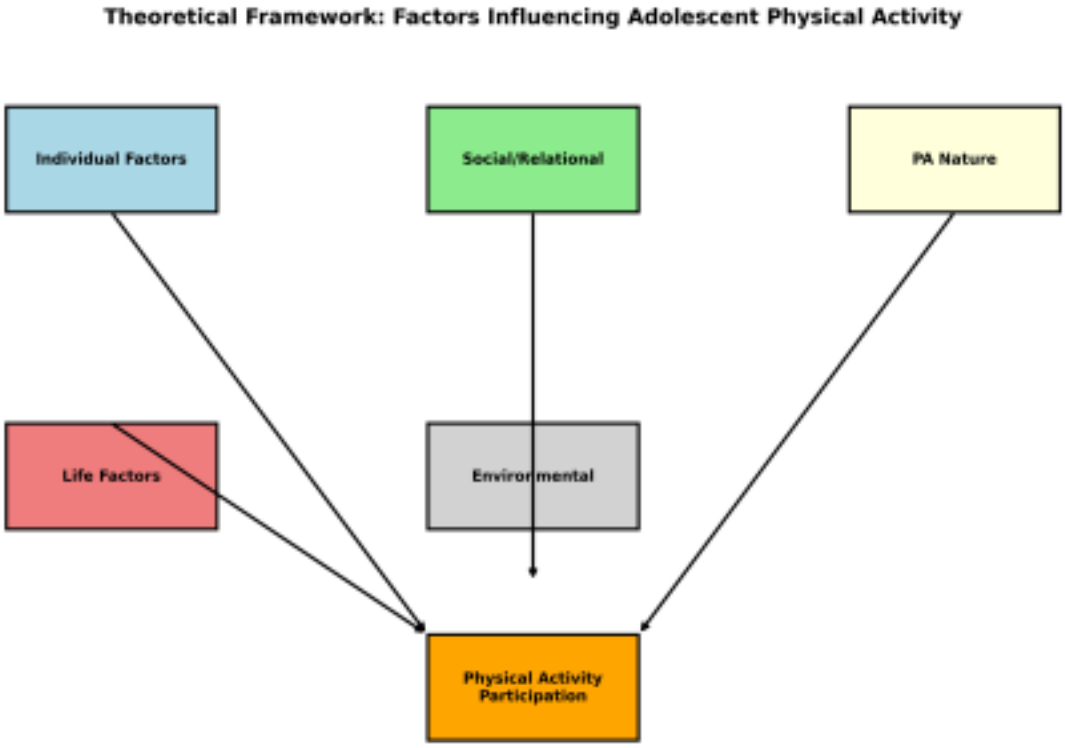
The data reveals important patterns in physical activity participation across demographic groups. While males showed slightly higher guideline compliance than females (15.9% vs. 14.7%), the differences were less pronounced than expected. More notable was the impact of socioeconomic status, with adolescents from high SES backgrounds showing 17.7% compliance compared to 14.2% for those from low SES backgrounds.

The screen time data revealed an interesting paradox: while adolescents with ≥4 hours of daily screen time showed the highest percentage meeting guidelines (15.9%), they had the lowest average days per week of activity (0.8 days), suggesting that a small subset of high screen time users may be very active, while the majority are quite sedentary.

3.6 Theoretical Framework Integration

The findings supported the utility of both Self-Determination Theory and socio ecological models for understanding adolescent physical activity behavior. The importance of autonomy, competence, and relatedness was evident across multiple themes, with adolescents who experienced satisfaction of these basic psychological needs showing higher levels of intrinsic motivation and sustained participation. Figure 4 illustrates the theoretical framework showing how individual factors, social/relational factors, PA nature factors, life factors, and environmental factors all influence adolescent physical activity participation.

Figure 4. Factors influencing Adolescent Physical Activity



The socio-ecological perspective was validated by the identification of influential factors operating at individual, interpersonal, organizational, community, and policy levels. The complex interactions between these levels highlighted the need for comprehensive interventions that address multiple determinants simultaneously rather than focusing on single factors in isolation.

4. Discussion

4.1 Principal Findings and Theoretical Implications

This comprehensive analysis of barriers and motivators for adolescent physical activity participation has revealed a complex, multi-level system of influences that operate across individual, social, and environmental domains. The identification of five higher order themes including individual factors, social and relational factors, physical activity nature factors, life factors, and environmental factors, provides a robust framework for understanding the multifaceted nature of adolescent exercise behavior and offers important insights for intervention development and policy formation.

The findings strongly support the utility of Self-Determination Theory as a framework for understanding adolescent physical activity motivation. The central importance of intrinsic motivation, autonomy, competence, and relatedness emerged consistently across multiple studies and populations, validating the theory's applicability to adolescent physical activity contexts. Particularly noteworthy was the finding that autonomous forms of motivation showed much stronger associations with sustained physical activity participation than controlled forms of motivation, suggesting that interventions focusing on external rewards or pressures may be less effective than those that foster intrinsic motivation and support basic psychological needs. The socio-ecological perspective was equally well-supported by the findings, with influential factors identified at every level of the social ecology. The complex interactions between individual characteristics, social relationships, organizational contexts, community

environments, and policy frameworks highlighted the limitations of single-level interventions and the need for comprehensive approaches that address multiple determinants simultaneously. This finding has important implications for intervention design and suggests that the most effective programs will be those that coordinate efforts across multiple levels of influence.

4.2 Individual-Level Insights and Implications

The prominence of individual factors in influencing adolescent physical activity behavior underscores the importance of addressing psychological, cognitive, and physical characteristics in intervention efforts. However, the findings also reveal important nuances in how these factors operate and interact with other influences. The central role of motivation, particularly intrinsic motivation, has significant implications for how physical activity programs are designed and delivered. Traditional approaches that rely heavily on external rewards, competition, or pressure to participate may inadvertently undermine the development of intrinsic motivation and lead to reduced participation when external supports are removed. Instead, interventions should focus on creating conditions that foster intrinsic motivation by emphasizing enjoyment, personal meaning, and alignment with individual values and goals.

The importance of self-efficacy and perceived competence suggests that interventions must carefully attend to adolescents' experiences of success and mastery. Programs that create opportunities for progressive skill development, provide appropriate challenges, and ensure that all participants can experience success are more likely to build the confidence necessary for sustained participation. This may require moving away from traditional competitive models that highlight skill differences toward more inclusive approaches that emphasize personal improvement and mastery.

The significant impact of body image concerns, particularly among female adolescents, highlights the need for interventions that address these issues directly rather than ignoring or minimizing their importance. This might include creating more private or supportive environments for physical activity, addressing unrealistic body image standards, and helping adolescents develop more positive relationships with their bodies through physical activity participation.

4.3 Social and Relational Considerations

The powerful influence of social and relational factors on adolescent physical activity behavior has important implications for intervention design and implementation. The consistent finding that family support represents one of the strongest predictors of adolescent physical activity participation suggests that effective interventions must engage families as active partners rather than passive recipients of information. Family-based interventions should focus on helping parents and other family members understand how to provide autonomy-supportive environments that encourage physical activity participation without excessive pressure or control. This might include education about the benefits of physical activity, strategies for providing logistical support, and guidance on how to encourage participation while respecting adolescents' developing autonomy and decision-making capabilities. The complex nature of peer influence on physical activity behavior suggests that interventions should carefully consider how to harness positive peer influences while minimizing negative ones. Peer-led interventions and programs that create opportunities for positive social interaction around physical activity may be particularly effective. However, these programs must be designed to avoid creating additional social pressures or exclusionary dynamics that could discourage participation among less confident or skilled adolescents.

4.4 Physical Activity Programming and Design

The findings related to physical activity nature factors provide clear guidance for how physical activity programs should be designed and delivered to maximize adolescent engagement and participation. The central importance of enjoyment suggests that fun should be a primary consideration in program design, not a secondary benefit that might emerge if other goals are achieved.

The preference for variety and choice indicates that effective programs should offer diverse activity options and allow adolescents to select activities based on their interests, goals, and preferences. This might require moving away from traditional models that require all participants to engage in the same activities toward more flexible approaches that accommodate individual differences and preferences.

4.5 Environmental and Policy Implications

The significant impact of environmental factors on adolescent physical activity participation has important implications for community planning, policy development, and resource allocation. The findings suggest that creating environments that support adolescent physical activity requires coordinated efforts across multiple sectors and levels of government. Improving access to facilities and programs requires not only building new facilities but also ensuring that existing facilities are accessible, affordable, and culturally appropriate for diverse adolescent populations. This might involve providing transportation to facilities, offering sliding-scale fees or scholarships, extending operating hours to accommodate adolescent schedules, and ensuring that programs are designed to be inclusive and welcoming to all participants.

4.6 Limitations and Future Research Directions

Several limitations should be acknowledged in interpreting the findings of this study. First, the reliance on published literature means that the analysis may be subject to publication bias and may not capture all relevant evidence. Second, intervention studies that test comprehensive, multi-level approaches are needed to determine the most effective strategies for promoting adolescent physical activity.Future research should focus on longitudinal studies that track adolescents over time to better understand how barriers and motivators change during development and how early experiences influence later physical activity participation.

5. Conclusions

This comprehensive analysis of barriers and motivators for adolescent physical activity participation has revealed the complex, multi-dimensional nature of factors that influence exercise behavior among young people aged 12-17 years. The identification of five higher-order themes such as individual factors, social and relational factors, physical activity nature factors, life factors, and environmental factors, provides a robust framework for understanding adolescent physical activity behavior and developing effective interventions. The findings show that adolescent physical activity behavior is not determined by any single factor but rather emerges from the complex interplay of influences operating across multiple levels of the social ecology. Individual factors such as motivation, self-efficacy, and body image are important, but they operate within broader social and environmental contexts that can either support or hinder physical activity participation. This understanding has profound implications for intervention development and suggests that the most effective approaches will be those that address multiple determinants simultaneously.

5.1 Theoretical and Practical Contributions

This study makes several important theoretical and practical contributions to the field of adolescent physical activity research. Theoretically, the findings provide strong support for both Self-Determination Theory and socio-ecological models as frameworks for understanding adolescent physical activity behavior. The central importance of intrinsic motivation, autonomy, competence, and relatedness validates SDT's applicability to adolescent physical activity contexts, while the identification of influential factors at multiple levels of the social ecology supports the utility of socio ecological approaches. Practically, the comprehensive categorization of barriers and motivators provides clear guidance for intervention development and policy formation. The identification of specific factors that are most important for different demographic groups enables the development of tailored approaches that address the unique challenges and opportunities facing diverse populations of adolescents.

5.2 Implications for Practice and Policy

The findings have significant implications for practitioners, policymakers, and researchers working to promote adolescent physical activity. For practitioners developing physical activity programs, the results suggest that effective interventions must prioritize enjoyment, provide choice and variety, create supportive social environments, and address practical barriers such as cost and transportation. Programs should be designed to foster intrinsic motivation and support basic psychological needs rather than relying on external rewards or pressures. For policymakers, the findings highlight the need for comprehensive approaches that address environmental and structural barriers to physical activity participation. This includes investing in accessible and affordable recreational facilities, creating

safe environments for physical activity, and developing policies that support physical activity participation across multiple settings including schools, communities, and healthcare systems. Addressing the adolescent physical activity crisis will require coordinated efforts across multiple sectors and levels of society. No single intervention or policy change will be sufficient to reverse the concerning trends in adolescent physical inactivity. Instead, comprehensive approaches that address individual, social, and environmental determinants simultaneously will be necessary. The development of effective interventions will require collaboration between researchers, practitioners, policymakers, and adolescents themselves. Young people must be engaged as active partners in intervention development rather than passive recipients of adult-designed programs. Their voices, perspectives, and preferences must be central to efforts aimed at promoting their physical activity participation.

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